

REMARKS

The applicants appreciate the Examiner's thorough examination of the Application and request reexamination and reconsideration of the Application in view of the following remarks.

The Office Action dated October 7, 2005 states that claim 7 is not pending in the subject application. However, claim 7 is still pending and has not been withdrawn from consideration.

Claims 1-4, 6, 7, 9-16, 18-20, 22 and 24 stand rejected under 35 USC §103(a) as allegedly being unpatentable over U.S. Patent No. 4,861,643 to Scollard in view of U.S. Patent No. 4,808,461 to Boyce et al. Applicants herein add new claim 25.

The subject invention results from the realization that the strength of a composite structure can be increased by translaminar reinforcement of the composite structure including fibers disposed through the thickness of the structure, and further that the strength of a joint between two such reinforced composite structures can be achieved by leaving the translaminar reinforcing fibers in each structure exposed at the surface of the structure at the joint region. A braze or other adherent material is then injected into the joint region and about the exposed fibers. In some cases the adherent material can be urged partially along the length of the reinforcing fibers and into each structure thereby providing a more cohesive bond at the joint region.

Scollard relates to an aerospace structure that includes two elements having mutually opposed surfaces, between which a void filler is placed. Filler is placed between the elements when they are placed in tool 24, shown in Fig. 2 of Scollard. The void filler doesn't join the two parts; it merely fills the void between two irregularly shaped parts.

Scollard, Col. 4, lines 10-16. To join the two parts, after the void filler has cured, the aerospace structure is removed from tool 24 and excess cured filler is milled with appropriate milling tools. As noted at column 4, lines 62-64, only after the void filler has cured, “rivet holes can be drilled or otherwise formed adjacent the trailing end of the structure.” Rivets may afterwards be placed in the rivet holes. The rivets join the two parts, not the “void filler”. And, each rivet extends into both parts.

The subject invention as claimed, however, is markedly different than the disclosure of Scollard. The subject invention teaches using two sets of reinforcing elements - one set placed in one adherend (part) and another set placed in another adherend (part). The reinforcing elements are left exposed at the joint region between the two parts. The parts are mated and an adherent is placed therebetween. The adherent may be either cured or glazed to provide a joint region with increased strength. The claimed reinforcing elements perform two functions: 1) they reinforce the layers of each composite part; and 2) they add surface area for the adherent to bond to which better locks the parts together.

The rivets of Scollard do not provide additional surface area for an adherent since the rivets are inserted after the adherent has cured. As such, Scollard clearly does not suggest the subject invention as claimed: Scollard has no disclosure regarding interstitially disposed reinforcing fibers extending from two parts to be joined and Scollard does not suggest the step of disposing an adherent into a joint region and about interstitially arranged reinforcing elements disposed through the thickness of each part.

To allegedly overcome the deficiencies of Scollard, the Examiner combines it with Boyce et al. Boyce et al. relates to the reinforcement of a composite part using reinforcing elements such as reinforcing fibers 14' shown in Fig. 8 of Boyce et al. Those reinforcing

elements, however, extend into both parts 58 and 60 and there is no adherent between them.

The Examiner stated in the Office Actions dated October 7, 2005 and March 31, 2004 that "no adherent is added to the space between parts 56 and 58 [in Boyce et al.] when they are joined to part 60. Yet, a skilled artisan might be motivated to include an adherent as seen in '643 to fill in possible voids between the component parts." One skilled in the art, however, would not have motivation to use an adherent between component parts 58 and 60 of Boyce et al. because no need for adherent would appear to exist from reading the disclosure of Boyce et al.

Moreover, the same reinforcing elements 14' extend through both parts 58 and 60 of Boyce et al. In sharp contrast, the applicants claim one set of reinforcing elements in one part, another separate set of reinforcing elements in the other part, and an interstitial arrangement of the exposed extending ends of both sets of reinforcing elements with an adherent about these ends of two separate sets of reinforcing elements. Even the combination of Scollard with Boyce et al. fails to teach this result. Moreover, the Examiner's proposed combination of Scollard and Boyce et al. is improper because there is no motivation for combining these two references: Scollard joints two parts using rivets; Boyce et al. combines two parts using a single set of reinforcing elements and teaches away from rivets or rivet holes. *See* Col. 1, lines 21-22.

When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references," a question of fact drawing on the Graham factors).

"The factual inquiry whether to combine references must be thorough and searching." Id. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 USPQ2d 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting C.R. Bard, Inc., v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998)); In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so.") (emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)).

The need for specificity pervades this authority. See, e.g., In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"); In re Rouffet, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998) ("even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious."); In re Fritch, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (the examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references").

In re Sang Su Lee, 277 F. 3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). Hence, there is no suggestion that Scollard's aerospace structure that includes two mutually opposed elements with a void filler therebetween and joined by rivets could use the reinforcing elements of

Boyce et al., nor is there any suggestion that Boyce et al.'s reinforcing elements could be used to join the two parts of Scollard's aerospace structure. And, neither reference discusses how two parts with an adherent therebetween could be modified to use interstitially arranged reinforcing elements. Only the applicants' disclosure teaches how an adherent can be disposed into a joint region about interstitially arranged reinforcing elements disposed through the thickness of each part.

Claim 1 of the subject application recites: “[a] method of joining composite parts comprising: disposing a plurality of extrinsic reinforcing elements each extending through the thickness of two composite adherends to be joined, at least a number of said reinforcing elements extending from the joint surface of each said adherend; assembling said adherends so that the joint surface of one said adherend faces the joint surface of the other said adherend defining a joint region therebetween, said extending reinforcing elements interstitially disposed in said joint region; and disposing an adherent within said joint region about said interstitially disposed reinforcing elements and said joint surfaces.” (Emphasis added.) The combination of Scollard and Boyce et al. does not teach, disclose or suggest disposing an adherent within said joint region about said interstitially reinforcing elements and said joint surfaces. Independent claims 9, 12, 20, 22, 24 and 25 each recite similar features that clearly distinguish over Scollard and Boyce et al.

As noted above, however, the Examiner's combination of Scollard and Boyce et al. is improper because no teaching or motivation exists for combining these two references.

Accordingly, the combination of Scollard and Boyce et al. does not teach, disclose or suggest the subject invention as recited in claim 1. Applicants respectfully request that the Examiner withdraw the rejection of claim 1 under 35 U.S.C. §103(a).

Also in contrast to Scollard and Boyce et al., claim 16 of the subject application recites: “[a] method of joining composite parts comprising: inserting, through the thickness of each said composite part, a plurality of extrinsic reinforcing elements extending from the joint surface thereof; selecting an adherent interlayer material for joining said parts; assembling said composite parts such that said joint surfaces face each other with said adherent interlayer therebetween; driving said reinforcing elements into said adherent interlayer and curing said interlayer locking said reinforcing elements therein.” (Emphasis added.) Scollard and Boyce et al. do not teach, disclose or suggest driving reinforcing elements into an adherent interlayer and curing said interlayer locking the reinforcing elements therein. Claim 18 also recites similar features that clearly distinguish over Scollard and Boyce et al.

Also in contrast to Scollard and Boyce et al., claim 13 of the subject application recites: “[a] method of joining a composite part with a non-composite part comprising: inserting, through the thickness of said composite part, a plurality of reinforcing elements extending from the joint surface thereof; assembling said composite part such that said reinforcing elements are proximate the joint surface of said non-composite part; and brazing said joint surfaces and said reinforcing elements to form a joint.” (Emphasis added.) Scollard and Boyce et al. do not teach, disclose or suggest brazing joint surfaces and reinforcing elements to form a joint. Independent claims 14, 15 and 19 recite similar features that also clearly distinguish over Scollard and Boyce et al.

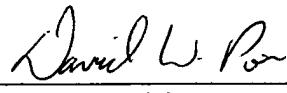
Also in contrast to Scollard and Boyce et al., claim 6 of the subject application recites: “[a] method of joining composite parts comprising: disposing a plurality of extrinsic reinforcing elements each extending through the thickness of two composite adherends, said

reinforcing elements extending from the joint surface of each said adherend; assembling said adherends so that the joint surface of one said adherend faces the joint surface of the other adherend; disposing an adherent interlayer between said opposing joint surfaces; urging said extending reinforcing elements of each said adherend through said adherent interlayer and interstitially locking said reinforcing elements therein.” Scollard and Boyce et al. do not teach, disclose or suggest disposing a plurality of extrinsic reinforcing elements each extending through the thickness of two composite adherends, the reinforcing elements extending from the joint surface of each adherend, and urging the extending reinforcing elements of each adherend through the adherent interlayer and interstitially locking the reinforcing elements therein. Claim 10 recites similar features that also clearly distinguish over Scollard and Boyce et al.

Accordingly, the combination of Scollard and Boyce et al. does not teach, disclose or suggest the subject invention as claimed by Applicants. Applicants respectfully request that the Examiner withdraw the above rejection under 35 U.S.C. §103(a).

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates collect in Waltham, Massachusetts, at (781) 890-5678.

Respectfully submitted,

  
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